SOME PARASITES OF PADDLEFISH (*POLYODON SPATHULA*) FROM THE YELLOWSTONE RIVER, MONTANA

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Abstract.—One species of copepod (*Ergasilus elongatus*), one trematode (*Diclybothrium hamulatum*), two nematodes (*Camallanus oxycephalus* and *Contracaecum* sp.), and two cestodes (*Marsipometra hastata* and *M. parva*) were recovered from 17 paddlefish (*Polyodon spathula*) collected from the Yellowstone River, Montana, on 11 and 18 May 1973. The male paddlefish averaged 69.4 nematodes and 157.6 cestodes per infected fish while the females averaged 12.0 nematodes and 415.7 cestodes. The higher intensity of cestode infection in female paddlefish was attributed to their larger size and consequent greater intake of food resulting in more exposure to the cestode intermediate hosts (*Cyclops bicuspidatus*).

There have been relatively few reports on the parasites of paddlefish (*Polyodon spathula*). Linton (1898) found tapeworms in paddlefish from the Ohio River, Ohio. Stockard (1907) mentions large numbers of cestodes in paddlefish from the state of Mississippi; and Wilson (1914) found parasitic copepods on paddlefish from the Mississippi River in Illinois and Iowa. Simer (1929 and 1930) and Beaver and Simer (1940) examined 171 paddlefish from the Tallahatchie River, Mississippi, and reported on trematodes and cestodes from them. Bangham and Vernard (1942) found one paddlefish from Reelfoot Lake, Tennessee, infected with trematodes, nematodes, and cestodes. Meyer (1946) discovered leeches parasitizing paddlefish while Causey (1957) examined one paddlefish and found parasitic copepods. Meyer (1960) studied cestodes from paddlefish collected from the Mississippi River in Iowa and the Missouri River in South Dakota. Hugghins (1972) examined one paddlefish from Fort Randall Reservoir on the Missouri River in South Dakota and found it parasitized with tapeworms and nematodes. Weisel (1973) reported unidentifted tapeworms and nematodes from 3 paddlefish from the Yellowstone River, Montana. The present study was undertaken in an effort to gain information on the parasites of paddlefish from Montana.

Methods

This report was based upon the necropsy of 17 paddlefish collected from the spawning run in the Yellowstone River near Intake, Montana, on 11 and 18 May 1973. The fish were eviscerated, and the viscera and gills were placed in plastic bags and frozen for later examination. The gastrointestinal tract was dissected, and the contents were washed onto a 200-mesh screen, then transferred to an illuminated tray (Barber and Lockard 1973) for examination. Cestodes were fixed in AFA (alcohol-formalin-acetic acid) and stained with Delafield's hematoxylin. Nematodes were placed in a mixture of 70 percent alcohol and 5 percent glycerine and later mounted in glycerine. The liver, heart, gall bladder, spleen, and gills were dissected and each was placed in a jar with water and agitated on a mechanical shaker for 5-10 minutes. The contents were poured onto a 200-mesh screen, washed, transferred to an illuminated tray, and examined. Trematodes and copepods were placed in a mixture of 70 percent alcohol and 5 percent glycerine. The ovaries, testes, and gas bladder were examined grossly and observed abnormalities checked microscopically.

Results

The ten male paddlefish had an average weight of 10.6 kilograms and range of 6.8 to 13.6 kilograms, while the seven females had an average weight of 22.8 kilograms and range of 20.0 to 27.2 kilograms.

Table 1 lists the rates of infection with copepods, trematodes, nematodes, and cestodes recovered from paddlefish during this study. The parasitic copepod *Ergasilus elongatus* was identified by Dr. Z. Kabata of the Fisheries Research Board of Canada. The trematode *Diclybothrium hamulatum* was identified by Dr. Fred P. Meyer of the Bureau of Sport Fisheries and Wildlife. Identifications of the nematodes *Camallanus oxycephalus* and *Contracaecum* sp. were confirmed by Dr. E. J.

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Table 1. Incidence of parasites of *Polydon spathula* collected from the Yellowstone River, Montana.

Parasite	Percent infected Male	Female	Mean no. of parasites (range) Male	Female
Ergasilus elongatus	30	14		
Diclybothrium hamulatum	100	100		
Camallanus oxycephalus	80	86	69.4 (12-302)	12.0 (4-25)
Contracaecum sp.	80	86		
Nematode cysts	100	100		
Marsipometra hastata	100	100	157.6 (34-356)	415.7 (37-1013)
M. parva	90	100		

Hugghins of South Dakota State University and Dr. G. L. Hoffman of the United States Fish and Wildlife Service, respectively. Spherical cysts (1-3 mm in diameter) containing larval nematodes were present on the surface of the stomach, pyloric caecum, and the intestine of all fish examined. All 17 paddlefish examined were infected by tapeworms identified from Beaver and Simer (1940) and Meyer (1960) as *Marsipometra hastata* and *M. parva*.

Discussion

It was felt that the handling procedures greatly reduced chances of discovering parasitic copepods as well as monogenetic flukes which may have been present on the gills of the fish. Causey (1957) says statements of incidence of infection for copepods have little value. Thus, the incidence of infection of copepods found in Table 1 may not be indicative of the number of infected fish actually present. Likewise, quantitative analysis on the presence of the monogenetic fluke would be of little value.

Differences in intensity of nematode infections (Table 1) between male and female paddlefish were noted but were difficult to interpret because of the presence of immature *Contracaecum* sp. in the intestine.

Simer (1930) and Beaver and Simer (1940) name three species of cestodes infecting paddlefish: *Marsipometra hastata*, *M. parva*, and *M. confusa*. Meyer (1960) examined tapeworms from these studies and his own material and concluded that *M. hastata* and *M. confusa* were synonymous. He also found *Cyclops bicuspidatus* to be the intermediate host of *M. hastata*. In this study no attempt was made to distinguish *M. confusa* from *M. hastata*. Females had a higher intensity of tapeworm infection than male paddlefish, and this may be attributable to larger size of the females. Females weighed more than twice as much as males and thus would have ingested more of the intermediate hosts of these parasites while feeding.

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Literature Cited

Bangham, R. V., and C. E. Vernard. 1942. Studies on parasites of Reelfoot Lake fish. IV. Distribution studies and checklist of parasites. J. Tenn. Acad. Sci. 17(1): 22-38.

Barber, D. L., and L. L. Lockard. 1973. Some helminths from mink in southwestern Montana, with a checklist of their internal parasites. Great Basin Nat. 33(1): 51-60.

Beaver, P., and P. H. Simer. 1940. A restudy of the three existing species of the cestode genus *Marsipometra* Cooper (Amphicotylidae) from the Spoonbill, *Polyodon spathula* (Wal.). Tr. Am. Micr. Soc. 59: 167-182.

Causey, D. 1957. Parasitic Copepoda from Louisiana freshwater fish. Am. Midl. Nat. 58(2): 378-382.

Huggins, E. J. 1972. Parasites of fishes in South Dakota. South Dakota Exper. Sta. Bull. 484: 1-73.

Linton, E. 1898. Notes on cestode parasites of fishes. Proc. U.S. Nat. Museum 20: 423-456.

Meyer, F. P. 1960. Life history of *Marsipometra hastata* and the biology of its host, *Polyodon spathula*. Iowa State Univ. Library, Ames, Iowa (unpubl.).

Meyer, M. C. 1946. Further notes on the leeches (Piscicolidae) living on freshwater fishes of North America. Tr. Am. Micr. Soc. 65(3): 237-249.

Simer, P. H. 1929. Fish trematodes from the lower Tallahatchie River. Am. Midl. Nat. 11(12): 563-588.

Simer, P. H. 1930. A preliminary study of the cestodes of the spoonbill, *Polyodon spathula* (Wal.). Tr. Ill. State Acad. Sci. 22: 139-145.

Stockard, C. R. 1907. Observations on the natural history of *Polyodon spathula*. Amer. Nat. 41: 753-766.

Weisel, G. E. 1973. Anatomy and histology of the digestive system of the paddlefish (*Polyodon spathula*) J. Morph. 140(2): 243-251.

Wilson, C. B. 1914. Copepod parasites of freshwater fishes and their economic relations to mussel glochidia. Bull. U.S. Bur. Fish. 34(1914): 331-374.